Earnings instability

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A stable stream of earnings is key to supporting many aspects of life. A regular job allows young people to leave the parental home and contemplate starting a family. The accompanying access to credit can enable the purchase of a home or car. The planning horizon lengthens so that investment and savings are more likely to be included in the household budget. Any earnings instability can hinder these steps, as well as increase the anxiety and stress of individuals and family members.

Earnings shocks within families can be dampened by the presence of multiple earners. However, a significant minority of Canadians either remain unmarried or become divorced (or widowed), and many of them become lone parents. Lone parents and unattached individuals are potentially more vulnerable to the effects of income instability since they have fewer income-smoothing options. Almost a quarter of employed lone mothers (the vast majority of lone parents) had low weekly earnings in 2000 (Chung 2004).[1] Lone parents may be affected by inflexible work hours, long commutes, and, in some communities, the absence of daycare. These factors and the general strain of lone parenthood are likely to reduce the employment prospects of lone parents and make them more prone to earnings instability. More than half of low-paid lone parents live in low-income families, although the situation of lone mothers was better in 2000 than in 1980.[2]

Unattached individuals are also vulnerable to earnings instability, particularly those under 40 with low income. In 2000, 22% of men and 31% of women under 40 were low-paid workers. Over 80% of low-paid unattached women were also in the low-income category, compared with 14% of low-paid married women. The proportion of unattached low-paid men in low income was slightly lower (78%) (Chung 2004).

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Table 1 Earnings instability

	1984-1989	1994-1999	1999-2004	Change
Two-parent families				%
Husband aged				
25 to 29	0.17	0.19	0.19	11.8**
30 to 34	0.15	0.16	0.17	13.3**
35 to 39	0.15	0.15	0.15	0.0
40 to 44	0.15	0.15	0.15	0.0
45 to 49	0.17	0.17	0.16	-5.9
Lone parents				
Men				
25 to 29	0.25	0.32	0.25	0.0
30 to 34	0.19	0.25	0.27	42.1**
35 to 39	0.19	0.19	0.22	15.8
40 to 44	0.18	0.18	0.19	5.6
45 to 49	0.19	0.19	0.18	-5.3
Women				
25 to 29	0.31	0.35	0.39	25.8**
30 to 34	0.26	0.29	0.32	23.1**
35 to 39	0.24	0.25	0.26	8.3**
40 to 44	0.23	0.21	0.22	-4.3
45 to 49	0.22	0.19	0.21	-4.5
Unattached				
Men				
25 to 29	0.26	0.25	0.24	-7.7
30 to 34	0.23	0.21	0.21	-8.7
35 to 39	0.19	0.19	0.18	-5.3
40 to 44	0.18	0.18	0.17	-5.6
45 to 49	0.19	0.19	0.18	-5.3
Women				
25 to 29	0.21	0.22	0.21	0.0
30 to 34	0.16	0.17	0.18	12.5**
35 to 39	0.15	0.16	0.17	13.3**
40 to 44	0.15	0.15	0.16	6.7 *
45 to 49	0.15	0.17	0.17	13.3**

* Difference between 1999-2004 and 1984-1989 is positive and significant at the 5% level.
** Difference between the 1999-2004 and 1984-1989 is positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

These figures suggest that lone parents and unattached individuals are also likely to experience greater financial insecurity. This study compares lone parents and unattached individuals with two-parent families over

the past two decades. The role of government transfers and family benefits in reducing earnings instability is also examined.

Earnings instability

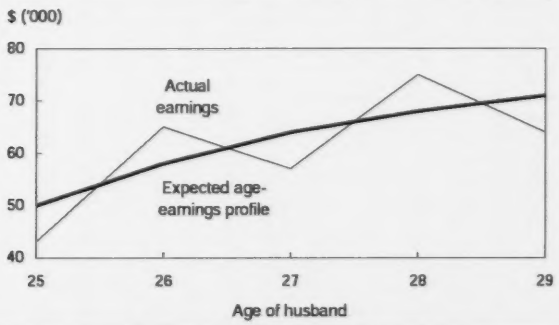
Earnings instability is measured by the short-term, up-and-down movements of an individual's or family's earnings around a longer-term average (Chart A). The analyses in this article describe annual variations around a six-year average adjusted for group-specific time trends (see *Data source and definitions*). All age ranges refer to the age of the individual (or husband for couples) at the beginning of each six-year period.

Two-parent families

The measure of earnings instability for two-parent families shows little indication of a widespread increase in instability in the past 20 years (Table 1). Among families with husbands aged 25 to 34, instability increased by about 12% to 13%, while for older couples, it either remained unchanged or fell slightly. (Among couples with husbands aged 45 to 49, it actually fell by about 6%.) Two-parent families had the lowest earnings instability, and this has remained virtually unchanged since the late 1980s.

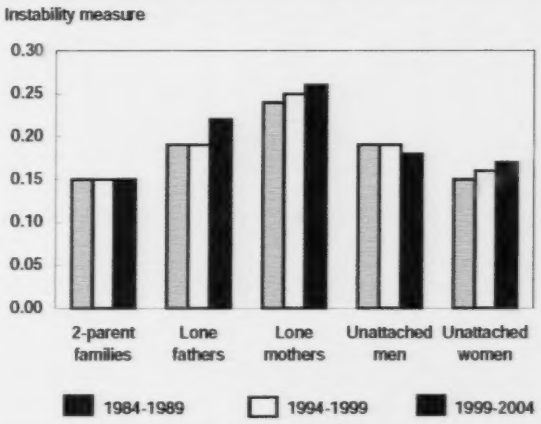
A small increase in earnings instability between 1984-1989 and 1999-2004 was evident for all age groups under 40 in the top third of earners (Table 2); however, virtually no change occurred for the bottom and middle thirds among families with husbands aged 35 and over, while a small increase was noted among younger families.

Chart A Earnings instability measures the deviation of actual annual earnings from a longer term average



Source: Hypothetical data, for illustration only

Chart B Lone mothers 35 to 39 had the highest earnings instability in all three time periods



Source: Statistics Canada, Longitudinal Administrative Databank

Lone parents

In general, earnings instability is greater among lone parents than among any other family category. The vast majority of lone parents (about 90%) are mothers, whose ability to smooth the flow of earnings is limited. Not surprisingly, the earnings instability of lone mothers is especially high, and it has grown in the past two decades (Chart B). Although changes in earnings instability differ considerably by age, the instability among young mothers (aged 25 to 34) rose by almost a quarter, with equal increases between the late 1980s and 1990s, and late 1990s and early 2000s. Unattached men and lone fathers experienced about the same level of earnings instability in the 1980s and 1990s. However, between the 1984-1989 and 1999-2004 periods, instability rose for lone fathers aged 30 to 34 but did not increase for unattached men.

The highest earnings instability is found among lone mothers aged 25 to 29 in the bottom third of earners. The average annual deviation from the mean earnings in this group was 58 log points during the 1999-2004 period, greater than in the 1980s and 1990s. In fact, the increase in instability between the 1984-1989 and 1999-2004 periods was higher than for any other age group in this earnings group (about 16%). In addition, for lone mothers younger than 35, instability increased in all earnings groups, including the top

Data source and definitions

The study uses a 10% version of Statistics Canada's **Longitudinal Administrative Databank** (LAD) based on tax data. LAD files provide detailed information about both individual and family income for those who filed an income tax return between 1982 and 2004 (the last year available at the time of writing). A 20% sample of all taxfilers is randomly selected, and individuals remain in the sample for as long as they appear on the T1 Family File (T1FF). Census families are formed from the personal data that filers provide on other family members. Filers are attached to their spouse (legal and common-law) by spouse's social insurance number, or by matching age, sex, address and marital status. LAD's panel nature, size, and richness of income data make it very attractive for studies of income inequality and instability. The most serious drawback is the limited range of demographic variables.

Three sets of lone parents and unattached individuals aged 25 to 49 were identified: those who filed tax returns each year from 1984 to 1989, 1994 to 1999, or 1999 to 2004. Only those whose family status did not change during their six years in the sample were considered. Similarly, two-parent families with husbands aged 25 to 49 whose family status did not change were identified. This allows a focus on earnings instability caused by labour market conditions as opposed to life events. Furthermore, families with self-employment income were excluded in order to measure instability associated with only paid employment.

All earnings, income and transfer figures were converted into year 2004 dollars using the consumer price index.

An important issue is whether families with zero earnings in one or more years should be excluded. Requiring positive earnings in all six years significantly reduces the size of the sample, particularly in the case of lone parents, but it has the advantage of allowing the use of log earnings. Assuming that families with zero earnings in one or more years do not differ in any systematic way is admittedly a strong assumption.

An alternative is to allow zero earnings in one or more years and analyze a model of earnings levels (as opposed to log earnings). To check the robustness of the main results, a broader sample allowing zero annual earnings in up to three years over a six-year period is considered.

In the analysis of the effect of the progressive income tax system and government transfers, a small percentage of families with non-positive market income is also dropped.

To investigate how earnings instability varies by age and earnings distribution, two-parent families, lone parents and unattached individuals are divided into five age groups (25 to 29, 30 to 34, 35 to 39, 40 to 44, and 45 to 49) and employment income thirds. Two-parent families are grouped based on the age of the husband. Employment income thirds are based on family earnings averaged over a six-year period.

One important aspect of earnings instability smoothing is the role of government transfers—in particular, Employment Insurance (EI) and social assistance. Unfortunately, the social assistance variable is available starting only in 1992. Moreover, EI underwent major changes in 1993 that considerably reduced the number of people eligible for benefits. Hence, in analysis related to the role of different smoothing mechanisms (including government transfers), only the periods 1994 to 1999 and 1999 to 2004 are used.

The first step is to assume that log earnings are generated by a random effects model:

$$y_{it} = f(age_i) + e_i + u_{it}$$

where f is a quadratic function of age. The model assumes a common age-log earnings profile but allows for different intercepts e_i for each family (standard random effects model assumptions also apply). The last term in the model is associated with transitory earnings (see Gottschalk and Moffitt 1994; Beach, Finnie and Gray 2003; Morissette and Ostrovsky 2005). Estimating $\hat{u}_{it}$ and computing $\overline{Var(\hat{u}_{it})}$ provides a simple estimate of earnings instability on either an individual or family level. Another dispersion measure considered is the mean absolute deviation (MAD) from the mean:

MAD has a simple intuitive interpretation: the average deviation (in percentage terms) of actual earnings from expected earnings.

$$\overline{MAD}_i = \left(\frac{1}{N}\right)\sum_{i=1}^{N}\left[\left(\frac{1}{T}\right)\sum_{t=1}^{T}\left|\hat{u}_{it}\right|\right]$$

To check the robustness of the results, family earnings are also estimated: $y^*_{it} = f(age_i) + e^*_i + u^*_{it}$, where y^*_{it} is family earnings (as opposed to log earnings). The mean absolute deviation is then computed by

$$\overline{MAD}^*_i = \left(\frac{1}{N}\right)\sum_{i=1}^{N}\left[\left(\frac{1}{T\cdot\bar{y}_i}\right)\sum_{t=1}^{T}\left|\hat{u}^*_{it}\right|\right]$$

where $\bar{y}^*_i$ is average family earnings over the six-year period. Note that $\overline{MAD}^*_i$ has to be rescaled by $\bar{y}^*_i$ to account for differences in earnings levels among families. (The results from the latter model are available from the authors.) While both $\overline{MAD}_i$ and $\overline{MAD}^*_i$ are calculated for the sample restricted to positive earnings, $\overline{MAD}^*_i$ is also used to analyze the sample that includes zero earnings.

The analysis of instability and the effects of government transfers and the income tax system emphasizes not only the overall levels of instability but also the differences in instability between the bottom and top thirds of the earnings distribution. The instability in the top third of earners provides a reasonable benchmark for assessing how well families in the bottom third fare, and to what degree transfers and taxes mitigate their earnings instability. Relative earnings instability (or relative income instability) is defined as the ratio of the bottom third to the top third.

Relative instability is used in the analysis of the role of different factors affecting the earnings instability of lone parents and unattached individuals.[3]

Table 2 Earnings instability by employment income

	1984-1989			1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
Two-parent families									
Husband aged									
25 to 29	0.25	0.12	2.08	0.28	0.13	2.15	0.28	0.14	2.00**
30 to 34	0.23	0.11	2.09	0.25	0.11	2.27	0.25	0.13	1.92**
35 to 39	0.22	0.11	2.00	0.23	0.11	2.09	0.22	0.12	1.83**
40 to 44	0.22	0.11	2.00	0.23	0.10	2.30	0.21	0.11	1.91**
45 to 49	0.24	0.13	1.85	0.25	0.11	2.27	0.23	0.12	1.92**
Lone parents									
Men									
25 to 29	0.42	0.11	3.82	0.55	0.11	5.00	0.33	0.08	4.13**
30 to 34	0.34	0.11	3.09	0.40	0.12	3.33	0.47	0.13	3.62**
35 to 39	0.37	0.09	4.11	0.31	0.10	3.10	0.36	0.11	3.27**
40 to 44	0.31	0.11	2.82	0.30	0.09	3.33	0.30	0.12	2.50**
45 to 49	0.31	0.13	2.38	0.30	0.11	2.73	0.28	0.12	2.33**
Women									
25 to 29	0.50	0.13	3.85	0.52	0.17	3.06	0.58	0.21	2.76**
30 to 34	0.46	0.11	4.18	0.48	0.13	3.69	0.51	0.14	3.64**
35 to 39	0.41	0.12	3.42	0.43	0.10	4.30	0.43	0.12	3.58**
40 to 44	0.35	0.13	2.69	0.37	0.10	3.70	0.38	0.11	3.45**
45 to 49	0.32	0.16	2.00	0.31	0.11	2.82	0.35	0.12	2.92**
Unattached									
Men									
25 to 29	0.43	0.12	3.58	0.41	0.14	2.93	0.37	0.15	2.47**
30 to 34	0.40	0.09	4.44	0.36	0.10	3.60	0.34	0.12	2.83**
35 to 39	0.34	0.09	3.78	0.33	0.09	3.67	0.30	0.11	2.73**
40 to 44	0.33	0.08	4.13	0.32	0.09	3.56	0.28	0.10	2.80**
45 to 49	0.33	0.08	4.13	0.34	0.10	3.40	0.29	0.11	2.64**
Women									
25 to 29	0.36	0.10	3.60	0.35	0.12	2.92	0.32	0.12	2.67**
30 to 34	0.30	0.08	3.75	0.29	0.09	3.22	0.30	0.10	3.00**
35 to 39	0.28	0.07	4.00	0.29	0.08	3.63	0.29	0.09	3.22**
40 to 44	0.27	0.07	3.86	0.29	0.07	4.14	0.28	0.09	3.11**
45 to 49	0.29	0.06	4.83	0.31	0.08	3.88	0.30	0.08	3.75**

** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

third, where it rose by 60% for lone mothers aged 25 to 29. The picture is much different though for older lone mothers. For those 40 and older, the increase in instability occurred only in the bottom third, and the magnitude was much smaller. In the other two earnings groups, instability either dropped or remained unchanged.

One salient finding is that the earnings instability of lone mothers in the bottom third is in some cases more than double that of two-parent families. For instance, in the 35-to-39 age category in 1999-2004, earnings instability for two-parent families was 0.22, while for lone mothers it was 0.43 (Chart C). On the other hand, among the top third of earners, both groups registered the same (0.12). In the bottom third of the earnings distribution, earnings instability is clearly a much bigger issue for lone parents than for two-parent families.

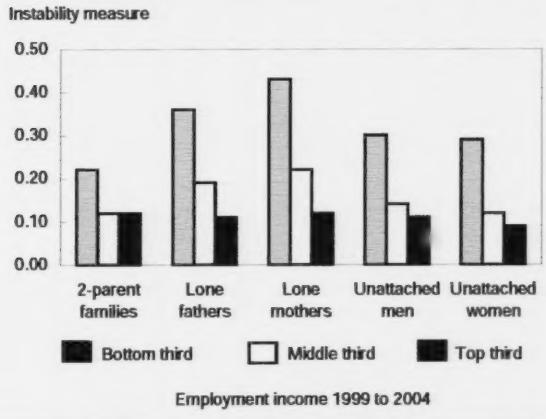
Not only is earnings instability among young lone parents much higher than for two-parent families, but the difference between top and bottom earners is also much larger. The relative instability ratio was close to two for young two-parent families in 1999-2004, compared with almost three for young lone mothers in 1999-2004 and almost four in 1984-1989. However, while in 1984-1989 relative earnings instability of lone mothers decreased with age, this was no longer true in 1999-2004.

Unattached individuals

Like lone parents, unattached individuals are likely more affected financially by job loss than two-parent families, who can often rely on two incomes. On the other hand, unattached individuals may be more flexible than lone parents in choosing their place of work and work hours. Not surprisingly, the earnings instability of unattached women is lower than that of lone mothers but generally higher than that of two-parent families. While unattached men under 35 have somewhat higher earnings instability than unattached women in all three income groups, their instability dynamics have been quite different. Overall, earnings instability of men declined in the past two decades, albeit modestly, but rose for unattached women 30 or older.

Breaking the trends down by employment income shows that the overall decline in men's earnings instability reflects mostly lower earnings instability in the bottom third (for all age groups). In the

Chart C Earnings instability in the 35-to-39 age group was significantly greater in the lowest earnings group



Source: Statistics Canada, Longitudinal Administrative Databank

middle third, instability remained virtually unchanged, while rising for all age groups in the top third. Similarly, the increase in earnings instability among unattached women was by no means universal. For women 30 and over in the bottom third of earnings, it remained virtually unchanged, with most of the increase taking place in the middle and top thirds. As a result, relative earnings instability was lower in 1999-2004 than in 1984-1989 for unattached women in all age groups.

Overall, earnings instability dynamics in Canada in the past 20 years present a fairly complex picture with no indication of widespread increases. Earnings instability varies considerably by age group and income level in both direction and magnitude, and is lowest among two-parent families and highest among lone mothers, particularly young ones. For unattached men, it has declined in recent years but is still somewhat higher than unattached women.

Earnings instability varies considerably with employment income and is much higher among families in the bottom third of earners than the top third. The difference in magnitude varies for age and family category, but it is fair to say that for two-parent families, the bottom-to-top earnings instability ratio is generally smaller, mostly due to lower instability in the bottom third.

It is important to keep in mind that these results pertain to a sub-sample of families and individuals with positive earnings in all six years. Results for a broader sample that includes families with zero earnings in some years are discussed below.

Taxes, government transfers and income instability

Employment Insurance (EI) and social assistance partially compensate for earnings losses related to job loss. Combined with government transfers in the form of refundable tax credits and the Child Tax Benefit, they provide substantial compensation for income loss and thus reduce income volatility. The progressive income tax system further reduces income volatility by restricting the impact of income gains and losses. This section describes the incremental effects of the tax and transfer system on earnings and income instability.

Two-parent families

Differences in earnings instability between top and bottom income groups in the 1999-2004 period were little changed from 1994-1999 for two-parent families. In all age groups, instability was at least 90% larger in the bottom third than in the top third (Table 3). The differences in market income instability were slightly smaller, but they were still in the 73% to 83% range for all groups in 1999-2004.

EI reduces instability for all families in the bottom third. In fact, EI has the largest mitigating effect among the youngest couples (husbands aged 25 to 29). In contrast to other age groups, however, the effect of EI in this age group is also strong in the top income group. Hence, the bottom-to-top difference in instability for market income plus EI is higher for families in this age group than in any other.

The effect of social assistance appears to be somewhat stronger among young couples (25 to 34) than among older ones. However, social assistance substantially reduces both instability and the differences in instability between bottom and top incomes for *all* age groups. The effect of social assistance on relative instability is stronger because it has practically no effect on the two-parent families in the top third of incomes.

In contrast, the role of tax credits in reducing income instability seems to be small. The only group where tax credits play any role is young families (husbands aged 25 to 29).

Table 3 Income instability and the tax and transfer system for two-parent families

	1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
25 to 29						
Earnings	0.27	0.12	2.25	0.27	0.14	1.93**
Market income	0.25	0.12	2.08	0.25	0.14	1.79**
+Employment Insurance	0.20	0.11	1.82	0.21	0.11	1.91**
+Social assistance	0.18	0.11	1.64	0.19	0.11	1.73**
+Tax credit	0.17	0.11	1.55	0.18	0.11	1.64**
+Family benefit	0.16	0.11	1.45	0.17	0.11	1.55**
Total income	0.15	0.11	1.36	0.16	0.11	1.45**
After tax	0.13	0.10	1.30	0.14	0.10	1.40**
Adjusted for family size	0.14	0.12	1.17	0.15	0.13	1.15**
30 to 34						
Earnings	0.24	0.11	2.18	0.24	0.12	2.00**
Market income	0.23	0.11	2.09	0.22	0.12	1.83**
+Employment Insurance	0.18	0.10	1.80	0.19	0.11	1.73**
+Social assistance	0.16	0.10	1.60	0.17	0.11	1.55**
+Tax credit	0.16	0.10	1.60	0.17	0.11	1.55**
+Family benefit	0.14	0.10	1.40	0.15	0.11	1.36**
Total income	0.14	0.10	1.40	0.14	0.11	1.27**
After tax	0.12	0.09	1.33	0.13	0.10	1.30**
Adjusted for family size	0.13	0.10	1.30	0.13	0.11	1.18**
35 to 39						
Earnings	0.23	0.10	2.30	0.22	0.11	2.00**
Market income	0.21	0.10	2.10	0.20	0.11	1.82**
+Employment Insurance	0.17	0.09	1.89	0.17	0.10	1.70**
+Social assistance	0.16	0.09	1.78	0.16	0.10	1.60**
+Tax credit	0.15	0.09	1.67	0.16	0.10	1.60**
+Family benefit	0.14	0.09	1.56	0.14	0.10	1.40**
Total income	0.13	0.09	1.44	0.13	0.10	1.30**
After tax	0.12	0.09	1.33	0.12	0.10	1.20**
Adjusted for family size	0.12	0.09	1.33	0.12	0.10	1.20**
40 to 44						
Earnings	0.22	0.10	2.20	0.21	0.11	1.91**
Market income	0.20	0.10	2.00	0.19	0.11	1.73**
+Employment Insurance	0.17	0.09	1.89	0.17	0.10	1.70**
+Social assistance	0.16	0.09	1.78	0.16	0.10	1.60**
+Tax credit	0.16	0.09	1.78	0.16	0.10	1.60**
+Family benefit	0.15	0.09	1.67	0.14	0.10	1.40**
Total income	0.14	0.09	1.56	0.14	0.10	1.40**
After tax	0.13	0.09	1.44	0.13	0.10	1.30**
Adjusted for family size	0.13	0.09	1.44	0.12	0.10	1.20**
45 to 49						
Earnings	0.24	0.11	2.18	0.23	0.11	2.09**
Market income	0.21	0.10	2.10	0.20	0.11	1.82**
+Employment Insurance	0.18	0.10	1.80	0.18	0.11	1.64**
+Social assistance	0.17	0.10	1.70	0.17	0.11	1.55**
+Tax credit	0.17	0.10	1.70	0.17	0.11	1.55**
+Family benefit	0.16	0.10	1.60	0.16	0.11	1.45**
Total income	0.15	0.10	1.50	0.15	0.11	1.36**
After tax	0.14	0.10	1.40	0.14	0.11	1.27**
Adjusted for family size	0.13	0.09	1.44	0.13	0.10	1.30**

** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

During the 1999-2004 period, family benefits also lowered employment income instability, particularly among families in the 30-to-44 age range, the ones most likely to have small children. For them, family benefits had the largest effect on reducing the differences between bottom and top income groups by reducing relative instability about 20 log points. For the 35-to-39 and 40-to-44 age groups, the reduction in instability in the bottom third was also substantial.

For the bottom third of earners, instability of total income was 25% to 36% lower than the instability of market income.[4] In other words, government transfers reduced market income instability for two-parent families by at least a quarter, and for those with husbands younger than 35 by more than a third. For all age groups, relative income instability was 1.45 or less, and for the 30-to-34 age group, as low as 1.27. EI, social assistance, and other government transfers reduced the ratio of the bottom to top earnings group from about 1.73-1.83 to 1.27-1.45 depending on age. For families in the bottom third, the total (before tax) income instability was 33% to 42% lower than earnings instability.

Finally, the tax system further reduced instability. The combined reduction after transfers and taxes compared with market income instability was 30% to 44%, and 38% to 48% compared with earnings instability.

In summary, government transfers, and to a smaller degree the income tax system, substantially reduce income instability for two-parent families in the bottom third of the earnings distribution.

Lone parents

Earnings instability in the 1999-2004 period was highest among young lone mothers ($\overline{MAD}_i$=0.39) but declined with age by 18 log points (Table 1). It was particularly high among young lone mothers in the bottom income group, 19 log points higher than the average. The difference between the bottom and top third, however, was higher among older lone mothers, with the earnings instability of those aged 30 or more in the bottom third being more than three times higher than those in the top third.

The overall smoothing effect of transfers and taxes on the earnings instability of lone mothers is evident when comparing differences in market-income and after-tax income instability (Tables 4 and 5). The ratio of the bottom third to the top third drops from 2.6 to 1.7 for those 25 to 29, from 3.2 to 1.8 for those 35 to 39, and from 2.5 to 1.5 for those 45 to 49. Notably, for lone mothers aged 30 and older, the drop is mostly or (for those 35 or older) almost entirely due to the fall in instability in the bottom third.

In all age groups, social assistance appears to be the single most important factor in reducing income instability among lone mothers—much more than for two-parent families. In the youngest age group, for instance, it reduces instability in the bottom third by 32% (from 0.4 to 0.3). Since social assistance has little effect on lone mothers in the top third, this also results in the largest drop in differences between bottom and top thirds (23%). The impact of social assistance on instability is somewhat smaller for the 45-to-49 age group, although it is still larger than any other factor.

Table 4 Income instability and the tax and transfer system for lone mothers

	1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
25 to 29						
Earnings	0.52	0.17	3.06	0.58	0.21	2.76**
Market income	0.47	0.17	2.76	0.52	0.20	2.60**
+Employment Insurance	0.41	0.14	2.93	0.44	0.17	2.59**
+Social assistance	0.20	0.12	1.67	0.30	0.15	2.00**
+Tax credit	0.19	0.12	1.58	0.27	0.14	1.93**
+Family benefit	0.16	0.11	1.45	0.20	0.13	1.54**
Total income	0.16	0.11	1.45	0.20	0.13	1.54**
After tax	0.16	0.10	1.60	0.19	0.11	1.73**
Adjusted for family size	0.16	0.10	1.60	0.19	0.11	1.73**
30 to 34						
Earnings	0.48	0.13	3.69	0.51	0.14	3.64**
Market income	0.41	0.12	3.42	0.45	0.14	3.21**
+Employment Insurance	0.35	0.11	3.18	0.38	0.12	3.17**
+Social assistance	0.21	0.10	2.10	0.26	0.12	2.17**
+Tax credit	0.20	0.10	2.00	0.24	0.11	2.18**
+Family benefit	0.17	0.10	1.70	0.18	0.11	1.64**
Total income	0.17	0.09	1.89	0.17	0.10	1.70**
After tax	0.16	0.08	2.00	0.17	0.09	1.89**
Adjusted for family size	0.16	0.08	2.00	0.17	0.09	1.89**
35 to 39						
Earnings	0.43	0.10	4.30	0.43	0.12	3.58**
Market income	0.36	0.10	3.60	0.38	0.12	3.17**
+Employment Insurance	0.30	0.10	3.00	0.32	0.11	2.91**
+Social assistance	0.20	0.10	2.00	0.25	0.11	2.27**
+Tax credit	0.19	0.09	2.11	0.23	0.11	2.09**
+Family benefit	0.17	0.09	1.89	0.18	0.10	1.80**
Total income	0.16	0.09	1.78	0.17	0.10	1.70**
After tax	0.15	0.08	1.88	0.16	0.09	1.78**
Adjusted for family size	0.15	0.08	1.88	0.16	0.09	1.78**
40 to 44						
Earnings	0.37	0.10	3.70	0.38	0.11	3.45**
Market income	0.31	0.10	3.10	0.33	0.11	3.00**
+Employment Insurance	0.25	0.10	2.50	0.29	0.11	2.64**
+Social assistance	0.18	0.10	1.80	0.22	0.11	2.00**
+Tax credit	0.17	0.09	1.89	0.21	0.11	1.91**
+Family benefit	0.16	0.09	1.78	0.17	0.11	1.55**
Total income	0.15	0.09	1.67	0.16	0.11	1.45**
After tax	0.14	0.09	1.56	0.16	0.10	1.60**
Adjusted for family size	0.14	0.08	1.75	0.15	0.10	1.50**
45 to 49						
Earnings	0.31	0.11	2.82	0.35	0.11	3.18**
Market income	0.26	0.11	2.36	0.30	0.12	2.50**
+Employment Insurance	0.22	0.11	2.00	0.26	0.11	2.36**
+Social assistance	0.18	0.11	1.64	0.21	0.11	1.91**
+Tax credit	0.17	0.11	1.55	0.20	0.11	1.82**
+Family benefit	0.16	0.11	1.45	0.17	0.11	1.55**
Total income	0.15	0.11	1.36	0.17	0.11	1.55 *
After tax	0.14	0.10	1.40	0.16	0.11	1.45 *
Adjusted for family size	0.14	0.09	1.56	0.15	0.10	1.50**

* The bottom to top differences in 1999-2004 are positive and significant at the 5% level.
** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

Table 5 Income instability and the tax and transfer system for lone fathers

	1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
25 to 29						
Earnings	0.55	0.11	5.00	0.33	0.08	4.13**
Market income	0.52	0.11	4.73	0.33	0.08	4.13**
+Employment Insurance	0.41	0.10	4.10	0.28	0.08	3.50**
+Social assistance	0.22	0.10	2.20	0.22	0.08	2.75**
+Tax credit	0.21	0.09	2.33	0.21	0.07	3.00**
+Family benefit	0.19	0.09	2.11	0.18	0.07	2.57**
Total income	0.19	0.09	2.11	0.18	0.07	2.57**
After tax	0.17	0.07	2.43	0.17	0.06	2.83**
Adjusted for family size	0.17	0.08	2.13	0.17	0.06	2.83**
30 to 34						
Earnings	0.40	0.12	3.33	0.47	0.13	3.62**
Market income	0.39	0.12	3.25	0.46	0.13	3.54**
+Employment Insurance	0.33	0.09	3.67	0.40	0.11	3.64**
+Social assistance	0.23	0.09	2.56	0.30	0.11	2.73**
+Tax credit	0.22	0.09	2.44	0.27	0.11	2.45**
+Family benefit	0.19	0.09	2.11	0.22	0.11	2.00**
Total income	0.18	0.09	2.00	0.21	0.11	1.91**
After tax	0.17	0.07	2.43	0.20	0.10	2.00**
Adjusted for family size	0.17	0.07	2.43	0.20	0.10	2.00**
35 to 39						
Earnings	0.31	0.10	3.10	0.36	0.11	3.27**
Market income	0.29	0.10	2.90	0.32	0.12	2.67**
+Employment Insurance	0.24	0.09	2.67	0.26	0.11	2.36**
+Social assistance	0.20	0.09	2.22	0.22	0.11	2.00**
+Tax credit	0.19	0.09	2.11	0.20	0.11	1.82**
+Family benefit	0.16	0.09	1.78	0.17	0.11	1.55**
Total income	0.15	0.09	1.67	0.15	0.11	1.36**
After tax	0.13	0.08	1.63	0.14	0.10	1.40**
Adjusted for family size	0.13	0.08	1.63	0.14	0.10	1.40**
40 to 44						
Earnings	0.30	0.09	3.33	0.30	0.12	2.50**
Market income	0.27	0.09	3.00	0.29	0.12	2.42**
+Employment Insurance	0.21	0.09	2.33	0.24	0.11	2.18**
+Social assistance	0.19	0.09	2.11	0.22	0.11	2.00**
+Tax credit	0.18	0.09	2.00	0.21	0.11	1.91**
+Family benefit	0.17	0.09	1.89	0.18	0.11	1.64**
Total income	0.16	0.08	2.00	0.15	0.11	1.36**
After tax	0.14	0.08	1.75	0.14	0.10	1.40**
Adjusted for family size	0.14	0.08	1.75	0.14	0.10	1.40**
45 to 49						
Earnings	0.30	0.10	3.00	0.28	0.12	2.33**
Market income	0.24	0.10	2.40	0.24	0.12	2.00**
+Employment Insurance	0.20	0.10	2.00	0.20	0.11	1.82**
+Social assistance	0.17	0.10	1.70	0.18	0.11	1.64**
+Tax credit	0.17	0.10	1.70	0.17	0.11	1.55**
+Family benefit	0.16	0.10	1.60	0.16	0.11	1.45**
Total income	0.15	0.09	1.67	0.14	0.11	1.27**
After tax	0.14	0.10	1.40	0.13	0.11	1.18**
Adjusted for family size	0.13	0.09	1.44	0.13	0.10	1.30**

** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

EI also lowers income instability. In all age groups, it is the second most important factor mitigating instability among lone mothers in the bottom income group. Overall, the reduction in instability (relative to market income) caused by EI and social assistance in the bottom third varies between 32% and 48%. For the youngest lone mothers, social assistance lowers the relative instability ratio from 2.6 (market income) to 2.0, which accounts for about two-thirds of the reduction from market to after-tax income. For older age groups, the effect is similar.

Tax credits and especially family benefits also play an important role in reducing instability in the bottom third. Their inclusion reduces instability for low-income lone mothers by 20% to 36%. All government transfers put together bring down the bottom-third to top-third ratios to levels that for some age groups (25 to 34 and 40 to 44) are lower than the after-tax ratios.

The impact of the progressive tax system is twofold. On the one hand, in all age groups, the instability of after-tax income in the bottom third is lower than the instability of the total income, although the reduction is 6% at most, and in some age groups, close to zero. On the other hand, in some age groups, the tax system has a larger effect in the top third, so the difference between bottom and top thirds is actually larger for after-tax income than before-tax income.

Unattached individuals

Considerable differences are apparent in the income instability of unattached men and women across age groups (Tables 6 and 7). In the

Table 6 Income instability and the tax and transfer system for unattached women

	1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
25 to 29						
Earnings	0.35	0.12	2.92	0.32	0.12	2.67**
Market income	0.33	0.12	2.75	0.29	0.12	2.42**
+Employment Insurance	0.27	0.11	2.45	0.25	0.12	2.08**
+Social assistance	0.24	0.11	2.18	0.24	0.12	2.00**
+Tax credit	0.23	0.11	2.09	0.23	0.12	1.92**
Total income	0.23	0.11	2.09	0.22	0.12	1.83**
After tax	0.20	0.10	2.00	0.20	0.11	1.82**
30 to 34						
Earnings	0.29	0.09	3.22	0.29	0.10	2.90**
Market income	0.27	0.09	3.00	0.27	0.10	2.70**
+Employment Insurance	0.21	0.09	2.33	0.23	0.10	2.30**
+Social assistance	0.19	0.09	2.11	0.21	0.10	2.10**
+Tax credit	0.19	0.09	2.11	0.20	0.10	2.00**
Total income	0.18	0.09	2.00	0.19	0.10	1.90**
After tax	0.16	0.08	2.00	0.17	0.09	1.89**
35 to 39						
Earnings	0.29	0.08	3.63	0.29	0.09	3.22**
Market income	0.26	0.08	3.25	0.27	0.09	3.00**
+Employment Insurance	0.21	0.08	2.63	0.23	0.09	2.56**
+Social assistance	0.19	0.08	2.38	0.21	0.09	2.33**
+Tax credit	0.18	0.08	2.25	0.19	0.09	2.11**
Total income	0.17	0.08	2.13	0.18	0.09	2.00**
After tax	0.15	0.07	2.14	0.17	0.08	2.13**
40 to 44						
Earnings	0.29	0.07	4.14	0.28	0.09	3.11**
Market income	0.27	0.07	3.86	0.25	0.09	2.78**
+Employment Insurance	0.20	0.07	2.86	0.20	0.08	2.50**
+Social assistance	0.19	0.07	2.71	0.19	0.08	2.38**
+Tax credit	0.18	0.07	2.57	0.18	0.08	2.25**
Total income	0.17	0.06	2.83	0.17	0.08	2.13**
After tax	0.16	0.06	2.67	0.15	0.08	1.88**
45 to 49						
Earnings	0.30	0.08	3.75	0.30	0.08	3.75**
Market income	0.26	0.07	3.71	0.26	0.08	3.25**
+Employment Insurance	0.21	0.07	3.00	0.22	0.08	2.75**
+Social assistance	0.18	0.07	2.57	0.19	0.08	2.38**
+Tax credit	0.17	0.07	2.43	0.18	0.08	2.25**
Total income	0.16	0.07	2.29	0.17	0.08	2.13**
After tax	0.15	0.06	2.50	0.15	0.08	1.88**

** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

bottom third, the earnings instability of unattached persons under 35 (measured by $\overline{MAD}_i$ in 1999-2004) is higher for men than for women. However, in all age groups, the relative (bottom to top) instability of men's earnings is lower than the relative instability of women's earnings, which is particularly high among women aged 45 to 49.

The most striking difference between unattached individuals and lone parents is that for the former, EI is a far more important factor in reducing instability than social assistance. Compared with market-income instability, the inclusion of EI reduces instability in the bottom third by 17% to 24% among unattached men and 13% to 20% among unattached women. EI also substantially reduces relative instability among both men and women in all age groups. Social assistance does not appear to play a major role among younger unattached individuals. While the reduction in instability it brings about is roughly constant among low-income unattached men of all ages (10%), the rate varies considerably with age among low-income unattached women (4% to 9% for all age groups except 45 to 49 where it peaks at 13%).

EI and social assistance together reduce the relative instability of market income between 20% and 30% for unattached men[5] and between 15% and 27% for unattached women. This is a major component of the overall reduction in relative instability generated by all transfers and the tax system. The overall reduction in relative instability (going from market to after-tax income) ranges from 27% to 38% for unattached men, and 25% to 42% for unattached women. Hence, EI and social assistance account for 65% to 75% of the overall effect for men and about 50% for women.

As with lone parents, the tax system reduces income instability in both bottom and top income thirds, so the impact on relative instability of unattached individuals is small, particularly for men. The effect is somewhat greater for older

Table 7 Income instability and the tax and transfer system for unattached men

	1994-1999			1999-2004		
	Bottom third	Top third	Ratio	Bottom third	Top third	Ratio
25 to 29						
Earnings	0.41	0.14	2.93	0.37	0.15	2.47**
Market income	0.39	0.14	2.79	0.35	0.15	2.33**
+Employment Insurance	0.30	0.13	2.31	0.29	0.14	2.07**
+Social assistance	0.26	0.13	2.00	0.26	0.14	1.86**
+Tax credit	0.25	0.13	1.92	0.25	0.14	1.79**
Total income	0.24	0.13	1.85	0.24	0.14	1.71**
After tax	0.22	0.11	2.00	0.22	0.13	1.69**
30 to 34						
Earnings	0.35	0.10	3.50	0.34	0.12	2.83**
Market income	0.33	0.10	3.30	0.32	0.12	2.67**
+Employment Insurance	0.25	0.10	2.50	0.26	0.11	2.36**
+Social assistance	0.21	0.10	2.10	0.23	0.11	2.09**
+Tax credit	0.21	0.10	2.10	0.22	0.11	2.00**
Total income	0.20	0.10	2.00	0.21	0.11	1.91**
After tax	0.17	0.09	1.89	0.19	0.10	1.90**
35 to 39						
Earnings	0.33	0.09	3.67	0.30	0.11	2.73**
Market income	0.31	0.09	3.44	0.29	0.11	2.64**
+Employment Insurance	0.23	0.09	2.56	0.22	0.10	2.20**
+Social assistance	0.20	0.09	2.22	0.20	0.10	2.00**
+Tax credit	0.19	0.09	2.11	0.19	0.10	1.90**
Total income	0.19	0.09	2.11	0.18	0.10	1.80**
After tax	0.17	0.08	2.13	0.16	0.09	1.78**
40 to 44						
Earnings	0.32	0.09	3.56	0.28	0.10	2.80**
Market income	0.30	0.09	3.33	0.27	0.10	2.70**
+Employment Insurance	0.22	0.09	2.44	0.21	0.10	2.10**
+Social assistance	0.19	0.09	2.11	0.19	0.10	1.90**
+Tax credit	0.18	0.09	2.00	0.18	0.10	1.80**
Total income	0.18	0.09	2.00	0.17	0.10	1.70**
After tax	0.16	0.08	2.00	0.15	0.09	1.67**
45 to 49						
Earnings	0.33	0.10	3.30	0.29	0.11	2.64**
Market income	0.28	0.09	3.11	0.25	0.10	2.50**
+Employment Insurance	0.22	0.09	2.44	0.20	0.10	2.00**
+Social assistance	0.19	0.09	2.11	0.18	0.10	1.80**
+Tax credit	0.19	0.09	2.11	0.17	0.10	1.70**
Total income	0.18	0.09	2.00	0.16	0.10	1.60**
After tax	0.16	0.08	2.00	0.15	0.09	1.67**

** The bottom to top differences in 1999-2004 are positive and significant at the 1% level.
Source: Statistics Canada, Longitudinal Administrative Databank

unattached women where relative instability is reduced by about 25 percentage points.

While the tax and transfer system considerably reduces the differences in instability in market income between the bottom third and the top third, it generally does so to a greater extent among two-parent families and lone mothers than among unattached individuals. For instance, among two-parent families with husbands aged 30 to 34, the difference in $\overline{MAD}_i$ for market income amounted to 10 log points (0.22 versus 0.12) in 1999-2004 (Table 3). Taxes and transfers reduced that difference by 70% to 3 log points (from 0.13 to 0.10). For lone mothers aged 30 to 34, the reduction was 74% (Table 4), but only 53% for unattached women the same age (Table 6).

Robustness checks

The main sample includes only families with positive earnings in all six years they were in the sample. The model assumes that the expected value of log earnings (or log income) is a linear function of an age polynomial. The main conclusions hold even if real earnings are used as the dependent variable.

The main question is whether the results can be generalized for a broader sample that includes those with zero annual family earnings.[6] The inclusion of zeros precludes the use of a log earnings model; the distribution of real earnings is not normal but the second model still produces consistent estimates as long as residuals are uncorrelated with age.

The main conclusions regarding recent trends in instability still hold. No widespread increase in earnings instability is evident in the past two decades. Most of the increases are observed among lone mothers 30 to 39 and unattached women. The earnings instability of lone mothers 40 and older, however, fell in both samples. This is an important confirmation of the main results since lone mothers probably have the highest fraction of families with zero annual earnings.

The broader sample model confirms that social assistance is by far the most important single factor

reducing relative (bottom third to top third) earnings instability among lone mothers. The federal Child Tax Benefit program and provincial family benefits also appear to play an important role. The tax system, on the other hand, reduces instability in absolute terms but often leads to higher relative instability.

For unattached individuals, the broader sample confirms that both EI and social assistance account for most of the reduction in relative instability. The broad sample shows a greater role for social assistance than the main sample—hardly surprising given that those with zero earnings are likely to depend more on social assistance than those who have positive earnings during the whole six-year period.

Summary

This study analyzed trends in the earnings instability of lone parents and unattached individuals in the past two decades. It also examined the extent to which government transfers and the income-tax system reduce the differences in instability among lone parents and unattached individuals in different segments of the earnings distribution, and compared them with two-parent families.

As in a previous study (Morissette and Ostrovsky 2005), no strong evidence of a widespread increase in earnings instability in the past two decades was found. For example, while the earnings instability of younger couples (husbands aged 25 to 34) in the main sample increased, instability did not change for couples with husbands aged 35 to 44 and has dropped for older couples. Similarly, the earnings instability of unattached men dropped in all age groups, while that of unattached women rose in all but the youngest.

Lone mothers in the bottom third of the earnings distribution have the highest earnings instability; for those aged 30 to 34, it is twice that of two-parent families with husbands aged 30 to 34. As well, employment and earnings increases for young lone mothers have not kept pace with their older counterparts or married mothers (Myles, Picot and Myers 2006).

As for the role of government transfers and the tax system in smoothing employment income instability, the former play a particularly important role in reducing income instability. However, EI is more important for unattached individuals, while social assistance is especially important for lone mothers. And, although income taxes reduce instability in absolute terms, they do not necessarily reduce the gap between earnings instability in the bottom and top third income groups.

Finally, it can be argued that a trade-off exists between stability and earnings; that is, some workers may accept greater instability for greater short-term compensation. For example, seasonal workers may be relatively well-compensated for short periods of work. Nevertheless, this study demonstrates that year-to-year instability is consistently higher in the lowest third of earners, regardless of population group. Thus long-term earnings instability is concentrated among those with low earnings, hindering their financial security and social inclusion.

Notes

1 Less than $375 weekly or less than $10 per hour assuming a 37.5 hour workweek.

2 The low-income cut-off is the level at which a family spends 20 percentage points more of its before-tax, after-transfer income on basic necessities than the average family.

3 Formula for tests:

$$P(\hat{R} \geq 1) = 1 - P\left(z \geq \frac{\hat{R} - 1}{\sqrt{\hat{V}(\hat{R})}}\right), \text{ where}$$

$$\hat{V}(\hat{R}) \approx \frac{1}{\hat{\theta}_2^2}\left[\hat{V}(\hat{\theta}_1) + \hat{R}^2\hat{V}(\hat{\theta}_2)\right],$$

$\hat{R} = \frac{\hat{\theta}_1}{\hat{\theta}_2}$ and $\hat{\theta}_1, \hat{\theta}_2$ are independent.

4 For instance, for the 35-to-39 age group, $\overline{MAD}_i$ dropped from 0.2 for market income to 0.13 for total income. Hence, the drop is [(0.2 - 0.13)/0.2]*100% = 35%.

5 For instance, for unattached men 35-to-39, the inclusion of EI and social assistance reduces relative instability from 2.64 to 2.00 or by [(2.64 - 2.00)/2.64]*100% = 24%.

6 A very small number of families reported single-digit annual earnings in some years. Annual earnings were set to zero if the amount in 2004 dollars was less than 20. Otherwise families who reported zero earnings in some years and positive but in fact zero earnings in other years (more than three) would have remained in the sample.

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